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NONE of us knows at what moment he may be called upon to treat intestinal obstruction—a most serious condition that strikes down and destroys so quickly those in the most robust health, and yet there is nothing in medicine or surgery that promises more in the near future than the operative treatment of this condition. With the recognition which the profession now has of the very slight danger there is in opening the abdomen, it only requires that the pathologic condition should be recognized early, and operative treatment instituted while the patient is still able to bear it, in order to get admirable results.

But a few years ago strangulated hernia was treated by hot and cold applications, by taxis, by waiting, by inversion, etc., before operation was considered, and the mortality was enormous. To-day the importance of operating at once is recognized, and death from strangulated hernia is rare. There is no more reason for delay in internal than in external strangulation.

¹ Read before the Hunterdon County, N. J., Medical Society at its annual meeting, October 18, 1892.



Intestinal obstructions are divided into acute and chronic. For convenience we shall consider the chronic forms first.

In chronic obstruction the patient suffers with abdominal pain of a colicky character; it is not constant, and if the difficulty is in the smaller bowel, it often comes on at a definite time after eating. There is gradual emaciation and failure of the vital powers. Vomiting may be very trifling, especially if the obstruction be low down, and it is rarely stercoraceous. Constipation, alternating with diarrhea, is not unusual. When the obstruction is low down, tenesmus is a constant and most valuable symptom. A patient on whom I operated for chronic obstruction due to malignant disease stated that he had had from ten to fifteen passages during the night, each being a small, white, hard mass about the size of a cherry. In another case on which I recently operated, I regarded the patient's answer as typical. On inquiring what was the condition of the bowels, he answered, "Very costive." "How often are they open?" "Four or five times a day." Further investigation showed that the constant tenesmus present made him go often to the closet, passing each time a small quantity of hardened feces. This is a very constant symptom in chronic obstruction, and I know of no other disease in which it is present.

It is not very unusual for patients to have recurrent attacks of almost complete obstruction, with little or no difficulty in the interval. In one of my cases, for a year before the operation the patient had repeated and increasing attacks of obstruction, during which there was entire loss of appetite, obstinate

constipation, constant vomiting, great abdominal pain and tenesmus, similar, she stated, to labor-pains. At the time of these attacks a tumor about the size of the adult fist appeared in the lower part of the abdomen. The tumor was an intussusception caused by a cicatricial contraction of the bowel. These attacks would last about two weeks, and were followed by an interval of entire relief, lasting nearly as long. Tympanites is not an early symptom, but it is common late in the disease.

Chronic obstructions may be due to (1) accumulations and impactions of fecal matter; (2) constrictions of the bowel due to cicatricial contraction or to malignant disease; (3) chronic invagination; (4) inflammatory changes in the wall of the gut due to external violence; (5) pressure of abscesses and growths external to the intestine.

To make a differential diagnosis of these various conditions is not usually very difficult. The most important one to exclude before considering the propriety of an abdominal section is obstruction by fecal accumulation. This condition is most common in adult women, the subjects of hysteria or insanity, with a history of continued and increasing constipation, a distended abdomen, a doughy tumor at the sigmoid flexure, and without emaciation.

Location of the obstruction. If the obstruction is high, vomiting is common; if it is low, vomiting is rare, but tenesmus exceedingly common. If there is but little urine secreted, the obstruction is probably high up. If it be in the duodenum or upper part of the jejunum, vomiting is copious,

but never feculent, and the vomited matters are usually bile-stained. If the obstruction is due to malignant disease, the symptoms rapidly increase in severity, and if the tumor can be felt it may be noted to rapidly increase in size. A tumor that appears and disappears, and is hard and sharply outlined, is probably an invagination; or if doughy and irregular in contour, may be impacted feces caught by a stricture of large caliber. In obstruction from cicatricial contraction there is usually a history of similar and less severe attacks.

In a recent case the diagnosis was readily made, that the obstruction was in the ascending colon; it was an intussusception, which was headed by a malignant growth. That the disease was in the large bowel was shown by the marked tenesmus and the absence of vomiting. That it was in the ascending colon was shown by the gas in the bowel raising the abdominal wall at the right iliac fossa when it was obstructed by the growth. When I saw the patient he had diarrhea, which is a symptom of an intussusception, and the diagnosis would have been certain if we had found a movable tumor that occasionally disappeared. The rapidity and severity of his symptoms, which had been present but two months, showed that the obstruction at the head of the intussusception was malignant.

The advantage of locating the obstruction and diagnosing its character is that we are able to make a small incision over the seat of the disease, instead of searching the entire abdomen through a long incision. In the case referred to, I made a short incision at the outer edge of the rectus muscle,

and was able to find and remove the disease at once.

TREATMENT. If we are able to locate the disease, we open the abdomen over it; if not, we make a median incision large enough to introduce the hand. The seat of the obstruction may be evident at once, as the bowel above the obstruction is greatly dilated and reddened, while below it is much contracted. If it be not evident, we feel for the head of the colon; if it be distended, we know that the obstruction is below; if it be collapsed, we know that it is above. Then tracing up or down, as may be necessary, there is but little difficulty in finding it.

If the obstruction be due to a growth within the bowel, several inches of the intestine should be removed with it, together with all affected glands, and the operation completed by bringing the intestine together by "lateral anastomosis," with not less than a four-inch opening. If, when the bowel containing the growth has been excised, the patient is greatly exhausted, a temporary artificial anus should be made, and the anastomosis operation performed some weeks later.

"Lateral anastomosis," or bringing loops of bowel side by side, and establishing an opening between them, is to-day considered preferable to joining them end to end. If a portion of the gut has been excised, the divided ends are inverted, closed by suture, the loops of bowel laid so that they overlap, and an opening established between them. If the obstruction is not removed, the bowel above the obstruction is laid beside the bowel below it, and the opening established. If the obstruction allowed

to remain be malignant, and the patient has but a short time to live, the more rapid method of establishing the opening by the aid of the catgut rings of Abbé, or the rubber ones of Ashton, is to be preferred. As the small opening obtained by the rings rapidly contracts and reobstructs, they are only suitable for such cases of malignant disease. If the disease has been thoroughly removed, the anastomosis should be made without rings by the method recently devised by Prof. Abbé, which gives a four-inch opening. In a case at the Jefferson College Hospital, in which I recently operated by this method, I found that it is easily and safely performed, makes a strong and reliable union, and gives a grand opening, but it takes much more time than the operation by the rings, and requires more care to prevent obstructive flexure of the bowel at the extremities of the line of suture.

In a patient of Dr. Jones, of Plymouth, Pa., from whom I removed several inches of intestine, containing an obstructive epithelioma, in 1887, before anastomosis by plates and rings was known, I made a temporary artificial anus, and introduced Dupuytren's enterotome. The result has been entirely satisfactory. The woman not only recovered from the operation, but, as five years have elapsed, she may be considered cured of the carcinoma. She is quite able, Dr. Jones informs me, to do a full day's work at the wash-tub, and her bowels act daily by the natural route.

This method of at once applying the enterotome might be used with advantage in those cases in which the operation has to be hurriedly completed by a temporary artificial anus, and in which the obstruc-

tion is so high that there is not enough bowel above the artificial anus to properly nourish the patient. If the enterotome was applied at the time of the operation, in a few days the entire length of the bowel could be used, and when the condition warranted it, the anastomotic operation could be performed.

In the case of a growth external to the bowel obliterating its lumen by pressure, the growth can rarely be removed; the bowel usually has strong attachments, and is often buried in the growth. Under these circumstances, as well as when a growth within the bowel has contracted extensive external attachments, an artificial anus must be made, or, preferably, the bowel above and below joined by lateral anastomosis.

If the obstruction is due to contraction, and but little of the length of the bowel is involved, a longitudinal incision may be carried through the bowel at the obstruction, and the incision sewed up transversely. This will greatly increase the caliber. The incision must not be too long, or it may flex the bowel so sharply upon itself as to cause obstruction. If this method cannot be used, "lateral anastomosis," with the long incision, will be necessary.

In acute obstruction the condition is very different. The patient is attacked by symptoms of the most urgent and distressing character, which run a rapid course, and unless relieved by art, will terminate fatally in a few days. "The patient is taken suddenly with intense, agonizing pain in the abdomen, accompanied by great vital depression; the abdomen is tender to the touch; there is obstinate constipation; vomiting occurs at once, first of

food, later of 'coffee-ground-looking' material, and ultimately it becomes stercoraceous. There is tympanites, great muscular weakness, the face is drawn with pain, and has an aspect of horrible anxiety, the features are pinched, the voice weak and muffled, cold sweat covers the cyanotic limbs, the complexion is livid, the pulse and respiration are rapid, and the temperature is subnormal."

These symptoms are the usual ones in intestinal obstruction, but their severity is not due to the intestinal obstruction, but in reality to the accompanying strangulation, which is found in nearly all cases of acute obstruction. By intestinal *obstruction* is meant the closing of the caliber of the bowel, so that none of the intestinal contents, whether fecal matters or gas, can pass; but if the constriction is tighter, it not only obstructs the fecal circulation, but the arterial and venous circulation as well; this condition is termed *strangulation*. It may be more or less complete, and on its completeness depends the severity of the symptoms.

Usually, the gut, when first caught within a hernial ring or some internal opening, has only the fecal circulation interfered with, but as the incarcerated bowel becomes distended with gas, it presses more tightly at the point of constriction, and the venous and, perhaps, the arterial circulation is also interfered with. Nor is it usual for the entirety of the incarcerated bowel to slough; in the average case only a portion sloughs, and that late in the attack. But there are cases in which the circulation of the blood is cut off at the moment of incarceration. In one case of strangulated hernia in a young German

on whom I operated eighteen hours after the intestine had been caught, the gut was black and gangrenous up to the very margins of the ring, and had to be removed.

In a case of volvulus of the transverse colon that I saw in consultation with Dr. Runkle, of Philadelphia, the patient was in collapse from the first, and died in less than forty-eight hours. The twist was so tight that the intestine was sloughing from one end to the other.

In another case the patient took a purgative Saturday night; it acted freely Sunday morning; at noon, symptoms of obstruction appeared. I saw him that night, and arranged to operate early the next morning, but he died before the time arrived, in less than twenty-four hours from the onset of the symptoms.

On the other hand, we may have complete obstruction, coming on suddenly and acutely, without strangulation and without collapse. I operated on a patient of Dr. James Graham, of Philadelphia, eight years ago for a strangulated umbilical hernia. It gave her no trouble until a few months ago, when it suddenly returned with symptoms of obstruction. Dr. Graham reduced it under ether, but the symptoms continued. Ten days later I saw the patient, and found that she still had complete obstruction. She had constant vomiting and obstinate constipation, neither fecal matter nor gas having passed for over ten days, but her general condition was excellent; there was no collapse and no evidence of strangulation. That evening, while the nurse was preparing the abdomen for the operation, she felt

something give way; there was immediately a feeling of great relief; shortly after flatus passed by the bowel, followed in the morning by fecal matter. In another case there was complete obstruction of sudden origin, with constant vomiting and no passage from the bowels for many weeks, but there was no collapse; at the operation we found complete obstruction due to a large enterolith, but the bowel was in excellent condition. Sudden and complete obstruction without ultimate strangulation and collapse are extremely rare, and these symptoms may be expected by the third or fourth day, and if the operation is to be successful no time is to be lost.

Acute obstruction may be due to (1) strangulated hernia; (2) impaction of foreign bodies or enteroliths, gall-stones, etc.; (3) intussusception; (4) volvulus; (5) strangulation by bands; (6) acute onset of one of the forms of chronic obstruction. Strangulation by bands is subdivided into (1) the solitary band; (2) cords formed from the omentum; (3) by Meckel's diverticulum; (4) by normal structures forming abnormal attachments, as an adherent vermiform appendix or a Fallopian tube; (5) through slits or holes in the mesentery or omentum.

DIAGNOSIS. Acute peritonitis occasionally simulates acute obstruction, but may be distinguished by the nature of its onset, the character of the vomiting, the quality of the pain, by palpation of the abdomen, and by the high temperature, though the latter is unreliable, as the temperature is not always high in peritonitis. Lead-colic may be excluded by the history, and other evidences of the poison.

Acute intussusception occurs usually in children. Vomiting is not a prominent symptom. There is often a discharge of blood from the rectum, attended by diarrhea and tenesmus. A definite tumor can often be felt. These cases may be fatal in twenty-four hours, or may last for days or weeks.

Strangulation by bands usually occurs in young adults with a previous history of peritonitis, and, perhaps, previous attacks of obstruction. The pain is severe; there is no tenderness; the vomiting is frequent and copious, becoming stercoraceous on the fourth or fifth day; the constipation is complete; there is extreme collapse, and death occurs on about the fifth or sixth day.

Volvulus occurs at the sigmoid flexure, or at the transverse colon of males of about forty years of age who have suffered from constipation. The pain is often referred to the back; the vomiting occurs late or not at all; the prostration is not usually extreme; death occurs on about the sixth day.

To be effectual, treatment must be prompt, if irrigation of the stomach and distention of the colon with fluids or gas does not relieve the patient, the abdomen must be opened at once, and under no circumstances delayed after the appearance of "coffee-ground" vomit. When acute obstruction is suspected, the operator should be chosen at once; he should be asked to see the patient immediately, and all preparations made for the operation, so that the moment the diagnosis is unmistakable there may be no delay whatever. If the cause of the obstruction is known, the most convenient incision is made; if not known, a median incision long enough to introduce the

hand is employed. The escaping bowel must be kept in warm, moist, aseptic compresses. Explore first the ileo-cecal region, the sigmoid flexure, and the pelvis. In a recent case of acute obstruction, it was not until I had nearly all of the intestines out that I found the obstructed bowel deep in the pelvis where it was held by a band formed during a previous attack of peritonitis. If the obstruction is caused by an enterolith or a foreign body, this must be pushed up into healthy bowel and removed through a longitudinal incision, which is closed by a continuous Lembert suture. If the obstruction is due to bands, these should be divided and removed, and if the bowel be gangrenous it should be excised. If the bowel is not gangrenous, but greatly over-distended, even if the cause of the obstruction be readily removed, the bowel must not be left in this condition, but must be emptied, even if we have to puncture it for the purpose; even a temporary artificial anus may be necessary.

Volvulus can rarely be untwisted unless we empty the gut by puncture. This cut can be temporarily clamped while we untwist, and then closed in the usual manner. To prevent the recurrence of the twist, Braun, of Königsberg, recommends suture of the colon by silk to the lateral abdominal wall.

If the patient is in extreme collapse, with a rigid, distended abdomen, operation should not be refused. No anesthetic is needed, or only a few drops. A short median incision is made, the first distended loop of bowel that presents itself is seized and withdrawn; this is rapidly fastened to the edges of the incision, and an artificial anus made. If the patient survives, more can be done later.

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